



MARK CENTURY* 100S

Numerical Contouring Control

A packaged 2-motion numerical contouring control
for turning and profile milling machines

* Trademark of General Electric Co.

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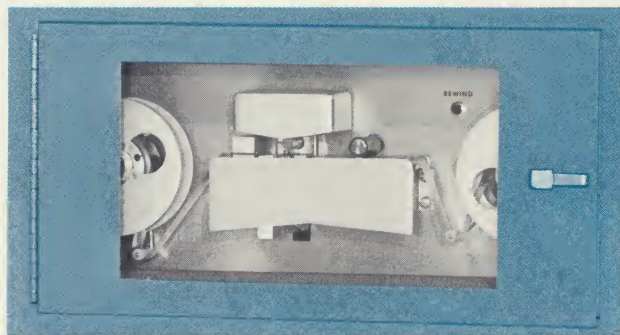
easily justified in any plant...

Mark Century packaged numerical controls are available in several models—each tailored to a special type or group of machines. The 100S control is a two-axis contouring system for turning and profile milling machines, and there are other G-E packaged systems for machines with different control requirements such as point-to-point operations, boring and milling.

All G-E packaged controls come in a basic design with a number of pre-engineered options which can be added inexpensively for extra versatility. The user benefits from the packaged design concept by getting a high-performance N/C system on machines of his choice without paying for unnecessary features.

Furthermore, all G-E packaged controls are substantially similar in design and construction, and this compatibility can reduce operating costs significantly where several are in use. Training expenses are less, and overall operating efficiency is improved as a result of similarities in programming and maintenance.

Since its introduction, the Mark Century 100S numerical control has received wide acceptance and is offered by a great many machine builders. The latest model of the 100S control, described here, incorporates a number of new features and improvements for added value to the user.



Standard photoelectric tape reader provides high speed data input at 300 characters per second.

Highly reliable

With the Mark Century 100S control, you receive the same high quality construction found in all General Electric N/C systems. Mark Century control design is the result of more than a decade of G-E experience in designing and building control systems and applying them on thousands of different machines for over 100 machine-tool manufacturers.

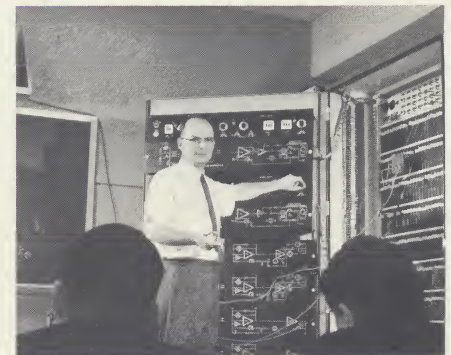
A single cabinet houses all control components to make the Mark Century 100S control compact and easy to service. The operator's console utilizes the latest in miniaturized push buttons for operator ease and fast, reliable operation. Command input is from EIA-standard, 8-channel punched tape. Printed circuit boards and components are interchangeable with other G-E controls.

Because the 100S control is carefully matched to each builder's machine, installation and start-up at your plant is quick and easy.

Complete service

A special Mark Century 100S control maintenance training school is available from General Electric for your personnel. And this is just the beginning, for G-E offers the most complete service package in the industry today. Other services include:

- Automatic check tape for logic circuits
- Unmatched product warranties
- Local stocks of replacement parts
- Complete service and instruction manuals
- Printed circuit board exchange program
- Computer software support
- Local service engineers on call 24 hours a day for world-wide maintenance service



G.E. training school educates your maintenance personnel in the care of your Mark Century 100S control.

for turning and profile milling

The Mark Century 100S contouring system can simultaneously control two machine motions. It is particularly suitable for turning and profile milling machines.

Simplified programming

Data input is binary-coded decimal using standard EIA, 8-channel punched tape. Data is read by a photoelectric tape reader operating at a speed of 300 characters per second. The binary-coded decimal format simplifies programming and maintenance. What's more, postprocessors for APT and ADAPT computer programs are available for the Mark Century 100S control to speed and simplify programming.

Both linear and circular interpolation are included. The Mark Century 100S has an electrical resolution of 0.0001 inch and an absolute electrical positioning accuracy of ± 0.0005 inch. Repetitive electrical positioning accuracy is ± 0.0004 inch.

These figures are based on a maximum contouring speed of 15-inches per minute, and 150-inches per minute traverse speed.

Easy to operate

Operator convenience is highlighted throughout the console design. Controls are functionally arranged on a sloping panel across the top-front of the unit.

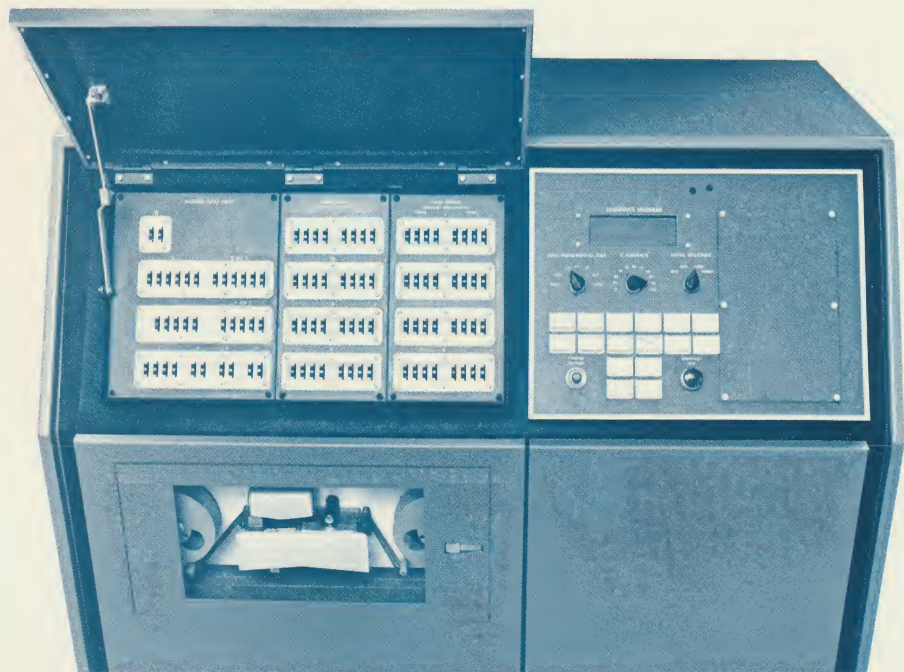
A modern NEMA 1, pressure-ventilated, floor-mounted enclosure contains all control components. Swing-open gasketed doors front, back, and top provide easy access to all parts of the unit. Interior walls are painted white for maximum visibility.

What's more, the compact Mark Century 100S contouring control measures only 44-inches wide, 28-inches deep, and 54-inches high.

Solid-state logic circuits

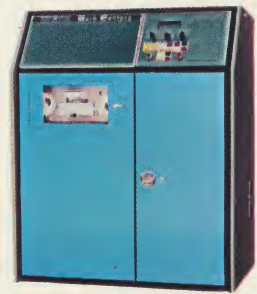
The Mark Century 100S numerical control system takes full advantage of the inherent reliability of transistorized printed circuits. Input data is distributed, stored, and acted upon by solid-state circuitry.

The logic-circuit portion of the control system is functionally arranged in modular-constructed panels. Plug-in printed circuit boards, clearly identified by type and plug-in receptacle number, make board changing easy and foolproof.



Mark Century 100S

numerical contouring control



Standard Features

High-speed Reader—A high-speed, 300-characters per-second photoelectric tape reader is provided.

Full Circular Interpolation—Permits programming arcs up to 90 degrees with a single block of input data.

Miscellaneous Functions—Increase versatility. A block of 100 auxiliary functions—such as on-off circuits, coolant flow and clutch circuits—can be programmed on the tape. Other circuits can be assigned to control spindle speeds and gear changing, to provide more automatic control of the machining process.

Spindle Speed Selections—Maximize flexibility. Up to 39 different spindle speeds may be programmed.

Tool Selection—Programming up to 9 different tools is possible.

Tool Zero Offsets—Can be set within plus or minus .0499 inch. A much greater range of tool wear or set-up error can be compensated.

Feed-rate Override—Lets operator slow down programmed feed rate at will. Capability from 0 to 100 percent of programmed value.

Feed-hold Push Button—Allows the operator to stop the control at any time without losing synchronization. The machine resumes normal operation when the button is released.

Machine Mode Selector—Permits Mark Century 100S controls to be operated in three modes:

Automatic—All machine commands come from programmed tape.

Semi-automatic—(optional) Machine operates from commands entered by operator on manual-data-input panel.

Manual—In-out and right-left jog buttons permit servo operation of each machine axis under manual control.

Zero-position Push Button Control—Eliminates need for expensive position readout equipment. Depressing the button sets all control counters to zero dimension and causes controlled mo-

tions to operate at top feed rate until their respective zero limit switches are actuated. At this point, machine is synchronized and ready to start a contouring cycle.

Tape Parity Check—Provides for reading error or parity check of each character read from the tape. A tape error will stop all motions at the last command and illuminate a "reading error" light.

Out of Synchronism Protection—Use of automatic acceleration limit circuit prevents the difference between commanded and actual positions from exceeding a predetermined amount.

Rotary Resolver Feedback Unit—Provides precise correspondence of command signal and machine member to resolution of 0.0001 inch.

Servo Drives—Provide highly reliable operation and maximum accuracy. Provision for either silicon-controlled rectifier or electro-hydraulic servos has been made.

Control Checkout—Permits complete logic circuitry check for proper operation by means of a check tape.

Optional Features

Several optional features are provided for those applications requiring these special capabilities. They can be added easily with plug-in units and minor re-wiring.

Tape Controlled Thread-cutting—Allows full N/C thread-cutting for longitudinal, face, and tapered threads—both internal and external. Maximum leads of .099999, .99999 and 1.99998 inches thread can be programmed.

Additional Pairs of Tool Offsets—Permits adding 4 pairs of tool offsets to the

standard control, making a total of 8 pairs of offsets.

Take-up Reels For Tape Reader—Provides greater tape handling capability than standard tumble box. The 4 $\frac{3}{8}$ inch diameter reels can accommodate up to 200 feet of tape.

Sequence Number Readout—Informs the operator visually of the machine operation being performed. It also gives him the ability to search out and repeat any particular machine sequence.

Manual Data Input—Enables the operator to duplicate from the console all in-

put information that can be provided from tape. This option is particularly valuable for set-up and prototype work.

Accupin* Feedback—Linear transducer provides direct measurement of machine tool position independent of rack and pinion or lead screw.

Choice of Servo Drives—Permits optimum machine/control performance. Choose either electro-hydraulic servo valve amplifiers or silicon-controlled rectifier drives to 1 hp.

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There is a Mark Century numerical control system to fit your needs whatever your performance requirements may be. See your G-E Sales Engineer, or machine-tool builder's representative for more information about General Electric numerical controls, including the new Mark Century 100S control.

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